FATIMA COLLEGE (AUTONOMOUS)

Re-Accredited with "A" Grade by NAAC (3rd Cycle)

94th Rank in India Ranking 2019 (NIRF) by MHRD

Maryland, Madurai- 625 018, Tamil Nadu, India

NAME OF THE DEPARTMENT : RESEARCH CENTRE OF HOME SCIENCE

NAME OF THE PROGRAMM : HUMAN NUTRITION & NUTRACEUTICALS

PROGRAMME CODE : PSNN

ACADEMIC YEAR : 2020-21

FATIMA COLLEGE (AUTONOMOUS), MADURAI-18

RESEARCH CENTRE OF HOME SCIENCE-

HUMAN NUTRITION AND NUTRACEUTICALS

For those who joined in June 2019 onwards

PROGRAMME CODE: PSNN

COURSE CODE	COURSE TITLE	HRS / WK	CREDIT	CIA Mks	ESE Mks	TOT. MKs
SEMESTER - I						
19PG1N1	Advanced Human Nutrition	6	4	40	60	100
19PG1N2	Advanced Dietetics	6	4	40	60	100
19PG1N3	Applied Physiology	6	4	40	60	100
19PG1N4	Advanced Dietetics Lab	4	2	40	60	100
19PG1N5	Clinical Laboratory Techniques Lab	4	2	40	60	100
19PGNEDC1	EDC-Nutrition & Dietetics	3	3	40	60	100
	Library	1	-	-	-	-
Total		**30**	**19**			
SEMESTER - II						
19PG2N6	Clinical Nutrition & Diet Therapy	6	4	40	60	100
19PG2N7	Functional Foods & Nutraceuticals	6	4	40	60	100
19PG2N8	Research Methodology	6	4	40	60	100
19PG2N9	Clinical Nutrition & Diet Therapy Lab	4	2	40	60	100
19PG2N10	Functional Foods & Nutraceuticals Lab	4	2	40	60	100
19PGNEDC2	EDC-Nutrition & Dietetics	3	3	40	60	100
	Library	1		-	-	-

COURSE CODE	COURSE TITLE	HRS / WK	CREDIT	CIA Mks	ESE Mks	TOT. MKs
Total		**30**	**19**			
SEMESTER - III						
PG3SIN1	Summer Internship	-	3	50	50	100
PG3N11	Functional Foods & Nutraceuticals in Preventive Dietetics	6	5	40	60	100
PG3N12	Community Nutrition	6	5	40	60	100
PG3N13	Analytical Instrumentation	6	5	40	60	100
PG3NE1/ PG3NE2	Food Product Development and Evaluation/ Institutional Management	4	4	40	60	100
PG3N14	Community Nutrition Lab	4	2	40	60	100
PG3N15	Techniques for Experimental Nutrition- I Lab	4	2	40	60	100
Total		**30**	**26**			
SEMESTER - IV						
PG4N16	Food Microbiology	6	5	40	60	100
PG4N17	Nutritional Biochemistry	6	5	40	60	100
PG4N18	Advanced Food Science and Processing Techniques	6	5	40	60	100
PG4NE3/ PG4NE4	Food Safety and Quality Control/ Nutrition in Critical Care and Disasters	4	4	40	60	100
PG4N19	Food Microbiology Lab	4	2	40	60	100
PG4N20	Nutrient Analysis Lab	4	2	40	60	100
PG4N21	Project*& Viva Voce		3	50	50	100

COURSE CODE	COURSE TITLE	HRS / WK	CREDIT	CIA Mks	ESE Mks	TOT. MKs
PG4N22	On the Job Training					100
Total		**30**	**26**			
	Total	**120**	**90**			

OFF-CLASS PROGRAMME

ADD-ON COURSES

Course Code	Courses	Hrs.	Credits	Semester in which the course is offered	CIA Mks	ESE Mks	Total Marks
	SOFT SKILLS	40	4	I	40	60	100
	COMPUTER APPLICATIONS SPSS	40	4	II	40	60	100
	MOOC COURSES (Department Specific Courses/any other courses) * Students can opt other than the listed course from UGC-SWAYAM /UGC /CEC	-	Minimum 2 Credits	-	-	-	
	COMPREHENSIVE VIVA (Question bank to be prepared for all the papers by the	-	2	IV	-	-	100

	respective course teachers)						
	READING CULTURE	15/ Semester	1	I-IV	-	-	-
	TOTAL		13 +				

EXTRA CREDIT COURSE

Course Code	Courses	Hrs.	Credits	Semester in which the course is offered	CIA Mks	ESE Mks	Total Marks
19PGSLN1	**SELF LEARNING COURSE for ADVANCED LEARNERS (Offered for II PG)**	-	-	III & IV	40	60	100

I M.Sc.,HUMAN NUTRITION AND NUTRACEUTICALS

SEMESTER –I

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSNN	**19PG1N1**	**Advanced Human Nutrition**	**Major Core**	**6**	**4**

COURSE DESCRIPTION

The course provides the knowledge on classification, functions, metabolism and deficiency of macro and micro nutrients and its interrelationship.

COURSE OBJECTIVES

- Gain in depth knowledge in the study of major and minor nutrients.
- Understand the recent trends in the study of nutrients
- Develop competence for undertaking nutritional investigations.

UNITS

UNIT –I MACRONUTRIENTS AND WATER (18 HRS.)

Carbohydrate - Definition, classification, functions, sources, requirements, digestion and absorption, Dietary Fibre - Definition, classification, functions, sources, requirements.

Protein - Definition, classification, functions, sources, requirements, digestion and absorption, Evaluation of protein quality- protein efficiency ratio, digestibility coefficient, biological value, net protein utilization, net protein ratio, chemical scores and PDCAAS.

Fat - Definition, classification, functions, sources, requirements, digestion and absorption, Essential fatty acids – functions and effects of deficiencies.

Water- Definition, distribution, functions, sources, water balance, fluid and electrolyte balance, Water Deprivation, dehydration, rehydration.

UNIT –II ENERGY (18 HRS.)

Energy – Definition, Units of energy, Determination of energy value of foods – Direct – Bomb Calorimetry, Indirect Calorimetry – Benedicts Oxy

calorimetry, Determination of energy requirements – BMR - Definition and factors influencing BMR, Measurement of Basal metabolism, Direct Calorimetry – Atwatar Rose Respiratory Calorimeter, Indirect Calorimetry – Benedict Roth Apparatus, Determination of BMR using production equations (ICMR),
Physiological fuel value, gross energy value, Respiratory Quotient, Thermal effect of foods (SDA),Energy requirements during work, Reference man, reference women, RDA for energy, food sources.

UNIT –III MINERALS (18 HRS.)

Calcium, Phosphorus, Magnesium, Sodium, Potassium, Iron, Iodine, Fluorine, Zinc, Selenium and Vanadium – Introduction, functions, sources, requirements, digestion, absorption, storage, excretion, deficiency and toxicity.

UNIT –IV VITAMINS (18 HRS.)

Fat soluble and water soluble vitamins (Thiamine, riboflavin, niacin, vitamin B12, folic acid,pyridoxin, pantothenic acid, biotin and ascorbic acid - nomenclature, functions, sources,requirements, digestion, absorption, storage, excretion, deficiency and toxicity.

UNIT –V INTERRELATIONSHIP AND INTERDEPENDENCE BETWEEN NUTRIENTS AND DRUG INTERACTION (18 HRS.)

Nutrient and nutrient interaction, Nutrient and drug interaction.

REFERENCES:

1. Berdanier, C.D.(1988). *Advanced Nutrition- Micronutrients*, Marcel Dekker, inc., New York.
2. Brown,M.L.(1990). *Present knowledge in Nutrition,* VI Edition, International Life Science Institute, Nutrition Foundation, Washington.
3. Gruff, J.L., Gropper, S.S, & Hunt, S.M (1995).*Advanced Nutrition and Human metabolism,* West Publishing Company, Minneapolis.
4. Helen, A. Guthrie. (1989). *Introductory Nutrition*, VII edition, Mosby College Publishing Col, Toranto.
5. Mahtab S. Bamji, Palhad Rao R, & Vinodhini Reddy, (1998). *Text book of Human Nutrition*,Oxford and IBH publishing co., Pvt.Ltd., New Delhi.
6. Sith K.L & Dekker M. (1990) .*Trace Minerals in Foods*, Inc., New York.

JOURNALS:

1. British journal of nutrition, Cambridge University Press, London.
2. Nutrition news, Nutrition Institute of Nutrition, Hyderabad.
3. Nutrition reviews, the Nutrient Foundation, Inc., New York.
4. Nutrition and food science- incorporating home economics and technology, Pvt. Ltd., England.

5. The journal of nutrition, Cambridge University Press, London.
6. World review of Nutrition and Dietetics- all volumes.

WEB REFERENCES:

1. www.livestrong.com
2. www.healthguidance.org
3. www.whfoods.com
4. www.everydayhealth.com
5. www.healthboards.com

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Recall the functions of nutrients in human body
CO 2	Explain the digestion, absorption, sources & requirements of different nutrients
CO 3	Compare the energy value of foods by using different Calorimetry
CO 4	Build the knowledge of nutrient and drug interrelationship
CO 5	Summarize the importance of fluid and electrolyte balance in human body

I M.Sc. HUMAN NUTRITION AND NUTRACEUTICALS

SEMESTER –I

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSNN	19PG1N2	Advanced Dietetics	Major Core	6	4

COURSE DESCRIPTION

The course explains the medical nutrition therapy for normal life cycle, common diseases, and special conditions like sports, space, deep sea and air travel.

COURSE OBJECTIVES

- To identify and describe the nutritional needs through life cycle.
- To identify and describe various disease conditions.
- To gain knowledge on appropriate nutritional management.
- To develop the attitude and capacity for taking up dietetics as a profession

UNITS

UNIT –I NUTRITIONAL CARE, NUTRITION DURING PREGNANCY, LACTATION, INFANCY (18 HRS.)

Nutritional Care Process - Definition & Model

Balanced diet, food guide pyramid, meal planning and factors influencing meal planning

RDA- Meaning and importance

Pregnancy – importance, Physiological and biochemical changes, Physiological adjustment that affect energy and nutrient demands, complications.

Lactation – Mechanism, Colostrum, transition milk, mature milk, comparison of cow's and human milk, nutritive value of human milk, nutrient demands.

Infancy – Importance, nutritional requirements, breast feeding – advantageous, bottle feeding- merits and demerits, feeding problems, weaning – definition, need, process, problems, supplementary foods – types.

UNIT –II NUTRITION DURING PRESCHOOL, SCHOOL GOING, ADOLESCENCE, ADULTHOOD, GERIATRICS (18HRS.)

Preschool Children - nutritional requirements, dietary guidelines & healthy food habits PEM – causes, signs, symptoms, biochemical and metabolic changes, treatment.

School going Children – nutritional requirements, importance of packed lunch, feeding problems- obesity, underweight, constipation, dental caries.

Adolescence - nutritional requirements, nutritional problems – obesity, under nutrition, anemia, anorexia, premenstrual syndrome, pre-marital health status.

Adulthood - nutritional requirements according to activity and income levels.

Geriatrics – physical, physiological and psychological changes, nutritional requirements, nutrition related problems –osteoporosis, constipation, degenerative diseases.

UNIT –III THERAPEUTIC DIET (18 HRS.)

Therapeutic diet – Definition, Purpose, Adaptations of normal diet to therapeutic diet, factors to be considered in diet prescription

Hospital diets – normal, clear fluid, full fluid and soft diet

Mode of feeding – enteral, parenteral feeding, TPN, Pre operative and post operative diets

Dietitians- definition, classification, responsibilities & code of ethics

UNIT –IV DIET IN BURNS, FEBRILE CONDITIONS AND WEIGHT MANAGEMENT (18 HRS.)

Diet in burns – classification of burns, dietary management

Diet during fever and infections: typhoid, tuberculosis, malaria, – causes, symptoms, dietary treatment.

Diet in weight management – Obesity: classification, etiology, metabolic aberrations, clinical manifestations and dietary management Underweight: classification, etiology, clinical manifestations and dietary management

UNIT –V SPORTS, SPACE AND SEA &AIR TRAVEL NUTRITION (18 HRS.)

Sports Nutrition

Definition, components of fitness, energy system – aerobic & anaerobic, nutritional demands of sports and dietary recommendations – objectives, nutritional requirements, dietary guidelines- carbohydrate loading, pre and post game meals, sports anaemia, water and electrolyte balance, losses and

their replenishments during exercise and sports events, dehydration and its effects

Space Nutrition

Definition, physiological changes & changes in body composition, classification of space foods, nutritional recommendations

Sea and Air Travel Nutrition:

Physiological changes in human body during sea and air travel; Health and nutritional problems encountered during sea and air travel; Nutrient requirements and dietary management during sea and air travel.

REFERENCES:

1. Antia F.P. (1989).Clinical Dietetics and Nutrition, Oxford University Press, Mumbai
2. Carolynne E. Townsead, Ruth a. Ruth.(2000).*Nutrition and Diet therapy*, (7th ed).Delmar publishers
3. Cornnie H. Robinson & Emena S. Weighly.(1989).*Basic Nutrition and Diet Therapy*, (6th ed), Macmillan Publishing Company, New York,
4. Davidson, S.S. Passmore, P. & Brack, J.F. (1993).Human Nutrition and Dietetics, (9th ed), F&S, Lingstone Ltd., Edinburgh and London,
5. Garrow.J.S. & James W.P.T. (1993) *Human Nutrition and Dietetics*, (9th ed), Chwchill Lurystone,
6. Kathleen Mahan. L. Sylvia Escott-Stump, Janice L Raymond & Krause (2011) .*Food & Nutrition Therapy,* (13th ed), Elsevier Publications.
7. Robinson CH.(1994) . *Normal & Therapeutic Nutrition* XVIII Edition, Macmillan Publishers Company, New York.
8. Srilakshmi.B (1995). *Dietetics,* New Age International Private Ltd., New Delhi.
9. Sue Rodwell Williams. (2001). *Basic Nutrition and Diet therapy*, Mosby publications.

JOURNAL REFERENCES:

1. Food and Nutrition Bulletin United Nations University Press, Japan.
2. Journal of American Dietetic Association, The American Dietetic Association, Mount Marris, Illinois, 61054, USA.
3. Nutrition Abstracts and Reviews, CBB International, UK.
4. Nutrition Reviews, Nutrition Foundation, Washington, DC.
5. The American Journal of Clinical Nutrition, Waverfy Press, USA.

6. The Indian Journal of Nutrition and Dietetics, Sri Avinashilingam University, Coimbatore.
7. The Indian Journal of Medical Research, The Indian Council of Medical Research, New Delhi.

WEB REFERENCES:

1. www.faseb.org/asns
2. www.nutritionfoundation in org
3. www.lifelines.com/ntnlnk.html
4. www.diabetes.org
5. www.americanheart.org
6. www.cancer.org
7. www.pugmarks.cons/aims
8. www.eatright.org/
9. www.sea&airtravelnutrition.org

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Describe nutritional care process
CO 2	Recognize the nutritional needs of different stages of life cycle
CO 3	Explain medical nutritional management.
CO 4	Plan therapeutic interventions for traumatic conditions
CO 5	Categorize meal planning for sports, sea and air travel

I M.Sc.,HUMAN NUTRITION AND NUTRACEUTICALS

SEMESTER –I

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSNN	19PG1N3	Applied Physiology	Major Core	6	4

COURSE DESCRIPTION

The course provides a detailed insight on the anatomy and functions of the various systems of the human body.

COURSE OBJECTIVES

- Organs of the body and their functions
- Different systems of the body, their functions with special reference to the control and feedback mechanisms
- Physiological changes at different stages of life.

UNITS

UNIT –I BLOOD AND ENDOCRINE SYSTEM (18 HRS.)

Blood

Composition and functions of blood and Plasma proteins,RBC – Structure and functions, Bone marrow – functions, Erythropoiesis, Haemoglobin, Life span ,fate, Anaemia, haemolysis, polycythemia, ESR, WBC – Classification and functions, Coagulation, Bleeding time, clotting time.Blood Groups.Blood indices,Use of blood for investigation and diagnosis of specific disorders.

Endocrine system

Structure, functions,role of hormones,regulation of hormonal secretion and disorders of pituitary gland, thryroid gland, parathyroid gland, pancreas and adrenal glands. Emphasis on physiology of Diabetes and stress hormones.

UNIT –II CIRCULATORY SYSTEM (18 HRS.)

Anatomical considerations of heart, valves of heart and its action, layers of heart, blood vessel – arteries, arterioles, capillaries, veins, vasovasorum.Blood pressure – factors and regulation.

Cardiac centre – heart rate – regulation, cardiac output, cardiac impulse, junctional tissues, cardiac cycle, heart sounds, ECG, coronary circulation, pulmonary circulation, cerebral circulation, hepatic circulation, renal circulation, cutaneous circulation and skeletal muscle circulation.

UNIT –III DIGESTIVE AND EXCRETORY SYSTEM (18 HRS.)

Digestive system

Review of anatomy and functions- secretary, digestive and absorptive functions of the digestive tract – Buccal cavity, stomach, pancreas, liver, small intestine and large intestine. Role of enzymes and hormones in digestion and absorption of carbohydrate, protein and fat. Dysfunction of liver,pancreas and gall bladder.

Excretory system

Anatomy and functions of kidney and nephrons, juxta glomerular apparatus. Formation of urine, micturition. Role of kidney in maintaining pH of blood. Water, electrolyte and acid base balance, diuretics.

UNIT –IV MUSCULO –SKELETAL AND RESPIRATORY SYSTEM (18 HRS.)

Musculo -Skeletal system

Structure and function of Bone tissue – osteocytes, osteoblasts, osteoclasts, structure of osseous tissue, section of femur bone. Types of muscles – structure and functions.

Respiratory system

Review of structure and functions of the respiratory tract, lung unit.Mechanism of respiration, transport of oxygen and carbon dioxide. Regulation of respiration, lung volumes, pulmonary function tests, Cardio – respiratory response to exercise and physiological effects of training.

UNIT –V NERVOUS SYSTEM AND REPRODUCTIVE SYSTEM (18 HRS.)

Nervous System

Review of structure and function of nervous system –central or somatic nervous system - neuron –types, structure, properties, myelin sheath, nerve endings, synapse, neuro transmitters, reflex arc, receptors, brain –cerebrum-cerebral cortex-cerebral lobes-structure and functions, cerebellum, medulla oblongata, - thalamus, hypothalamus. The role of Hypothalamus in various body functions – obesity, sleep, memory. Autonomic nervous system – sympathetic and para sympathetic – actions, functions of ANS. Blood Brain Barrier, CSF

Reproductive System

Primary and accessory sex organs and secondary sex characters; Menstrual cycle, menopause and post menopausal changes.

REFERENCES:

1. Best and Taylor, The Living Body, Chapman and Hall ltd., London.
2. Chatterji (1999).*Human Physiology*, Roy Publications
3. Gitanjali Chatterjee (1999) *Handbook of Food and Nutrition*, Rajat Publications.
4. Guyton, A.C& Hall J.B (1996):*Textbook of Medical Physiology*,9th edition W.B Sanders Company, Prism Books (Pvt) Ltd,Bangalore.
5. Kamala Krishnaswami (2000) *Nutrition Research-Current Scenerio and future trends,* Oxford and IBH Publishing Co.Pvt.ltd.,
6. Lraine M.Summerfield (2000).*Nutrition ,exercise and behaviour an integrated approach to Weight management* ,Thomson learning,
7. Mahtab S. Bamji, Pralhad & Rao Vinodhini Reddy.(1996) *Textbook of Human Nutrition,* Oxford, IBH publishing Co. pvt ltd.,
8. Margaret McWilliams (1994).*Experimental Food laboratory Manual*,Surjeet Publications,
9. Mickael J.Gibney,Ian A.Macdonald & Helen M.Roche (2004),*Nutrition and metabolism* Blackwell Publications,.
10. Mike Epsy (2001) *Nutrition Eating for good health*,Surbhi Publications,Jaipur,.
11. Sembulingam & Prema Sembulingam (2006), *Essentials of Medical Physiology*, Yaypee Brothers, Medical Publishers (p) Ltd, New Delhi.
12. Vijay Kamshik (2000).*Food science and nutrition,* Mangal Deep Publications. Jaipur

JOURNAL REFERENCES:

1. Journal of Applied Physiology
2. Journal of General Physiology
3. BMC Physiology
4. Physiological Reviews
5. International Journal of Basic & Applied Physiology

WEB REFERENCES:

1. www.livescience.com
2. www.springer.com
3. www.nature.com
4. www.innerbody.com
5. www.physiologyweb.com

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Identify and recall the aspects of human physiology
CO 2	Illustrate the anatomy of the various organ systems of the body
CO 3	Categorize the functions of all the systems
CO 4	Describe the interrelationship of nutrition and physiology
CO 5	Compare the alterations in organ systems during disease conditions

I M.Sc.,HUMAN NUTRITION AND NUTRACEUTICALS

SEMESTER –I

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSNN	19PG1N4	Advanced Dietetics Lab	Lab	4	2

COURSE DESCRIPTION

The practical course offers hands-on experience in the planning, preparation and calculation of nutrients for the menu planned for various stages of normal life cycle, deficiency disorders, hospital diets, sports and space nutrition.

COURSE OBJECTIVES

- To develop skills in planning and preparing diets for various stages of normal life cycle.
- To get expertise in planning and preparing diets for various deficiency disorders.
- To plan diets for weight management, burns and febrile conditions.

UNITS

UNIT –I PLANNING AND PREPARATION OF NORMAL DIETS (12 HRS.)

Planning and preparation of normal diets- diets during pregnancy, lactation, preschool, school going, adolescence and old age.

UNIT –II PREPARATION OF SUPPLEMENTARY FOODS (12 HRS.)

Preparation of supplementary foods for infants and nutritional deficiency disorders.

UNIT –III ROUTINE HOSPITAL DIETS (12 HRS.)

Classification of routine hospital diets – clear fluid, full fluid &soft diet and diet for febrile conditions- acute and chronic.

UNIT –IV DIET PLAN FOR BURNS AND WEIGHT MANAGEMENT (12HRS.)

Diet plan for burns and weight management- obesity & underweight.

UNIT –V DIET PLAN FOR SPORTS ANAEMIA (12 HRS.)

Planning of meals for sports anaemia, pre & post game meals and space.

REFERENCES

1. Cornnie H. Robinson & Emena S. Weighly.(1989).*Basic Nutrition and Diet Therapy*, (6th ed), Macmillan Publishing Company, New York.
2. Kathleen Mahan. L. Sylvia Escott-Stump, Janice L Raymond & Krause (2011) .*Food & Nutrition Therapy,* (13th ed), Elsevier Publications.
2. Robinson CH.(1994) . *Normal & Therapeutic Nutrition* XVIII Edition, Macmillan Publishers Company, New York.
3. Srilakshmi.B (1995). *Dietetics,* New Age International Private Ltd., New Delhi.
4. Sue Rodwell Williams. (2001). *Basic Nutrition and Diet therapy*, Mosby publications .

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Plan and prepare menu for normal life cycle.
CO 2	Choose appropriate supplementary foods for infants.
CO 3	Solve problems of nutritional deficiency disorders with modified diets.
CO 4	Differentiate the various hospital diets.
CO 5	Construct diets for sports, burns and weight management.

I M.Sc.,HUMAN NUTRITION AND NUTRACEUTICALS

SEMESTER –I

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSNN	**19PG1N5**	**Clinical Laboratory Techniques Lab**	**Lab**	**4**	**2**

COURSE DESCRIPTION

The course provides hands on training on the estimation of the qualitative and quantitative analysis of blood and urine constituents**.**

COURSE OBJECTIVES

- To understand the techniques of qualitative and quantitative analysis of blood and urine constituents
- To familiarise with the functioning of the equipments used in clinical lab
- To interpret the biochemical parameters for the diagnosis of diseases.

UNITS

UNIT –I QUALITATIVE ANALYSIS OF URINE (12 HRS.)

A. INORGANIC CONSTITUENTS
   - Calcium
   - Phosphate

B. ORGANIC CONSTITUENT
   - Creatinine
   - Urea
   - Uric Acid

C. ABNORMAL CONSTITUENT
   a. Physical Characteristics
      - Colour
      - Specific Gravity
      - PH

   b. Chemical Constituents
      - Protein
      - Glucose
      - Bile Salts
      - Bile Pigments

- Ketone Bodies

UNIT –II QUANTITATIVE ANALYSIS OF URINE (12 HRS.)

A. Urea

B. Creatinine

C. Calcium

UNIT –III HAEMATOLOGICAL EXAMINATION (12 HRS.)

A. Haemoglobin

B. Packed Cell Volume

UNIT –IV EXAMINATION OF BLOOD (12 HRS.)

A. Glucose

B. Lipid Profile

- Cholesterol
- TG
- LDL
- HDL
- VLDL

UNIT –V EXAMINATION OF SERUM (12 HRS.)

A. Uric Acid

B. Bilurubin

C. Calcium

D. Total Protein/ Albumin/ Globulin/ AG Ratio

REFERENCES:

1. J. Jayaraman, 1996. Laboratory Manual in Biochemistry. New Age International Ltd. New Delhi.
2. Oser, B.L.Harke's Physiological Chemistry XIV Edition, Tata Mc-Graw Hill, Publishing Company Ltd., Bombay, 1954.
3. Raghuramulu, N.Nair, K.M.Kalyanasundaram, S.A.Manual of laboratory techniques, National Institute of Nutrition, ICMR, Silver Prints, Hyderabad, 1983.
4. S.Sadasivam. and A. Manickam, 1991. Biochemical Methods. New Age International Pvt. Ltd., New Delhi.

WEB REFERENCES:

1. www.msdmanuals.com
2. www.cdc.gov
3. www.labtestsonline.com

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Identify organic, inorganic and abnormal constituents of urine
CO 2	Explain the quantitative analysis of urine
CO 3	Describe the haematological examination
CO 4	Organize the examination of blood glucose and lipid profile
CO 5	Recognize the serum constituents

I M.Sc. HUMAN NUTRITION AND NUTRACEUTICALS

SEMESTER –I

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSNN	19PGNEDC1	Nutrition & Dietetics	EDC	3	3

COURSE DESCRIPTION

This course offers scientific understanding of the role of nutrition in health diseases.

COURSE OBJECTIVES

- To understand the basics of nutrition.
- To learn the menu planning methods for family members.
- To learn the clinical aspects of disease conditions and diet therapy.

UNITS

UNIT –I INTRODUCTION TO NUTRITION (9 HRS.)

Nutrition – definition, nutritional status, nutrients and their function, relationship of food and health – Characteristics of good nutrition – balanced diet – BMI, IBW, Dietary guidelines-basic food groups, food pyramid

UNIT –II MACRO NUTRIENTS (9HRS.)

Classification, functions, sources, deficiency of carbohydrates, protein, lipids.

UNIT –III MICRO NUTRIENTS (9 HRS.)

Functions, sources, deficiency disorders of Vitamins – Fat soluble vitamins A, D, E, K; Water Soluble vitamins – B1, B2, Niacin, B6, B12, Folic acid.

Minerals – Ca, P. Zn, Fe, I, Fl.

UNIT –IV NUTRITION FOR DEVELOPMENTAL MILESTONES (9 HRS.)

Menu planning, Principles of planning meals,

Nutritional importance of pregnancy, changes incurred and complications

Nutritional importance of lactation

Nutrition during infancy – growth and development, advantages of breast feeding and bottle feeding, formulation criteria for bottle milk. Supplementary foods.

Nutritional importance for adolescence.

UNIT –V PRINCIPLE OF DIET THERAPY (9 HRS.)

Definition of Diet therapy, Foods to be included and avoided – obesity and underweight, diabetes mellitus, typhoid, peptic ulcer, anaemia, CVD.

BOOK REFERENCES:

1. Srilakshmi B (2012) *Dietetics*, New Age International Publishers,
2. Antia F.P. (1989) *Nutrition Dietetics*, Oxford University Press
3. Swaminathan M (1988) *Advanced text book on Food and Nutrition*, Vol I and Vol II, The Bangalore Printing and Publishing Co., Ltd.,

WEB REFERENCES:

1. www.americanheart.org
2. www.cancer.org
3. www.diabetes.org
4. www.eatright.org/
5. www.pugmarks.cons/aims

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	State the different nutrition terms and concepts of food and nutrition.
CO 2	Describe the role of macro and micro nutrients in human nutrition.
CO 3	Identify the food sources and deficiency effects of micro and macronutrients.
CO 4	Summarise the importance of nutrition in the different stages of life span.
CO 5	Apply the principles of diet therapy in the management of diseases.

I M.Sc.,HUMAN NUTRITION AND NUTRACEUTICALS

SEMESTER –II

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSNN	19PG2N6	Clinical Nutrition and Diet Therapy	Major Core	6	4

COURSE DESCRIPTION

The course provides a comprehensive knowledge required for the prevention and treatment of various diseases.

COURSE OBJECTIVES

- To identify and describe various disease conditions.
- To gain knowledge on appropriate nutritional management.
- To develop the attitude and capacity for taking up dietetics as a profession.

UNITS

UNIT –I DIET IN ENDOCRINE DISORDERS (18 Hrs.)

Diabetes Mellitus - Etiology, classification, signs and symptoms, treatment, changes in metabolism during diabetes, nutritional management, food exchange systems, diabetes education and prevention program.

Hypo and Hyperthryroidism - Etiology, signs and symptoms and medical nutritional therapy.

Gout- Etiology, signs and symptoms and medical nutritional therapy.

UNIT –II DIET AND CARDIOVASCULAR DISEASE (18Hrs.)

Atherosclerosis - Risk factors, causes, signs and symptoms, medical nutritional therapy, Hypertension – Etiology, types, dietary treatment, education and prevention.

UNIT –III DIET AND RENAL DISEASES (18 Hrs.)

Etiology, signs and symptoms, medical nutritional therapy of Glomerulonephritis, Nephrotic syndrome, Renal failure and Kidney stones.

UNIT –IV DIET AND GASTRO INTESTINAL PROBLEMS (18 Hrs.)

a. Upper gastro intestinal tract – Etiology, signs and symptoms, medical nutritional therapy of Hiatal hernia and Peptic ulcer.

b. Lower gastro-intestinal tract- Etiology, signs and symptoms, medical nutritional therapy of Celiac sprue, Diverticular disease, Constipation and Diarrhea.

c. Liver diseases- Etiology, signs and symptoms, medical nutritional therapy of Hepatitis, Cirrhosis and Hepatic coma

d. Gall bladder disease – Etiology, signs and symptoms, medical nutritional therapy of Cholecystitis and Cholelithiasis.

e. Pancreatic disease - Etiology, signs and symptoms, medical nutritional therapy of Pancreatitis

UNIT –V NUTRITIONAL SUPPORT IN CANCER, AIDS AND FOOD ALLERGIES (18 Hrs.)

Cancer - Nature and causes of cancer, relation of cancer and foods, effects of cancer, Nutritional therapy and support for cancer treatment, precaution.

AIDS – Definition, Progression and symptoms, malnutrition and AIDS, medical nutrition therapy and practical suggestions for symptom management.

Food allergies and intolerances – Definition, Types of reactions, Types of allergens, diagnosis, treatment.

REFERENCES:

1. Cornnie H. Robinson and Emena S. Weighly, (1989). *Basic Nutrition and Diet Therapy*, 3nd .Ed, Macmillan Publishing Company, New York.
2. Davidson, S.S. Passmore, P. Brack, J.F. (1993). *Human Nutrition and Dietetics*, 9th Ed, F&S, Lingstone Ltd., Edinburgh and London,
3. Garrow.J.S, W.P.T. James, 9th Ed 1993, *Human Nutrition and Dietetics*, Churchill Livingstone.
4. Kathleen Mahan.L , 13th Ed, (2011), Sylvia Escott-Stump, Janice L Raymond *Krause's Food & Nutrition Therapy*, Elsevier Publications,.
5. Robinson CH (1994), *Normal and Therapeutic Nutrition*, 18th Ed, Macmillan Publishers Company, NewYork.
6. Srilakshmi.B, *Dietetics,* 1995, New Age International Private Ltd., New Delhi.
7. Sue Rodwell Williams, 2001, *Basic Nutrition and Diet therapy*, Mosby publications.

JOURNAL REFERENCES:

1. Food and Nutrition Bulletin, United Nations University Press, Japan.
2. Journal of American Dietetic Association, American Dietetic Association, Mount Marris, Illinois, 61054, USA.
3. Nutrition Abstracts and Reviews, CBB International, UK
4. Nutrition Reviews, Nutrition Foundation, Washington, DC.

5. The American Journal of Clinical Nutrition, Waverfy Press, USA.
6. The Indian Journal of Medical Research, Indian Council of Medical Research, New Delhi.
7. The Indian Journal of Nutrition and Dietetics, Sri Avinashilingam Deemed University, Coimbatore.

WEB REFERENCES:

1. www.americanheart.org
2. www.cancer.org
3. www.diabetes.org
4. www.eatright.org/
5. www.pugmarks.cons/aims

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Identify the characteristics of various disease conditions.
CO 2	Describe the medical nutritional management of different disease.
CO 3	Plan diets for degenerative diseases.
CO 4	Categorize the foods used in the treatment of diseases.
CO 5	Summarize the treatment strategies for food allergy and food intolerance.

I M.Sc.,HUMAN NUTRITION AND NUTRACEUTICALS

SEMESTER –II

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSNN	19PG2N7	Functional Foods and Nutraceuticals	Major Core	6	4

COURSE DESCRIPTION

The course contents are an eye opener to students on the terminologies, importance, therapeutic applications of nutraceuticals from sources through plant, animal and microbes.

COURSE OBJECTIVES

- To enable students understand the relation between Functional Foods, Nutraceuticals to Food and Drugs
- To introduce them to various functional food groups and products
- To enable students understand the regulatory aspects of Functional Foods and nutracueticals

UNITS

UNIT– I INTRODUCTION TO FUNCTIONAL FOODS & NUTRACEUTICALS (18 HRS.)

Functional foods and Nutraceuticals – Definition and history.

Teleology – definition, primary and secondary metabolites.

Organisational Models for Nutraceuticals - a) Food Sources b) Mechanism of Action c) Chemical Nature

Consumer Marketing - Factors for marketing functional foods and nutraceuticls.

UNIT –II FUNCTIONAL COMPONENTS FROM PLANT SOURCES (18 HRS.)

(i) Nutrient Molecules: a) Phospholipids b) Vitamin K c) Carbohydrate Derivatives- Dietary fiber - Types and sources, Physical and Physiological properties d) Minerals – Zinc, Selenium.

(ii) Non Nutrient Molecules: a) Phenolic compounds – Phytoestrogens (Isoflavones, Lignans) Flavonoids – Quercetin, kempferol, Flavones –

limonene, Flavols – Catechin, Phenolic acid – Ellagic acid, Caffeic acid
b) Phytosterols and phyto stenols c) Saponins d) Tannins
e) Carotenoids - Lycopene, Beta-carotene, Lutein and zeaxanthin

(iii) Hypocholesterolemic and antidiabetic components

UNIT–III FUNCTIONAL COMPONENTS FROM ANIMAL SOURCES(18 HRS.)

(i) Major and minor components in cow's Milk and Human Milk
Proteins – lactalbumin, lactoglobulin, lactoferrin, immunoglobulins,
Derived peptides – casein phospho peptides, glycomacro peptides,
Lactose. Fat. Mineral – zinc, selenium, Calcium

(ii) Dietary lipids - Conjugated Linolenic Acid, linoleic acid, oleic acid, GLA

(iii) Omega 3 and Omega 6 Fatty Acids

(iv) Structured Lipids

UNIT –IV MICROBES AS FUNCTIONAL FOODS (18 HRS.)

General Functions of Intestinal Microflora

Prebiotics - Definition, role of prebiotic as functional ingredient, examples.

Probiotics - Definition, role of prebiotic as functional ingredient, examples.

Symbiotics - Definition, functions, examples.

UNIT –V HERBS AND FLOWERS AS FUNCTIONAL FOODS (18 HRS.)

Action of Herbs and Efficacy on:

a) Nervous System-Ginseng, St.John's wort, Ginkgo biloba, Bacopa Monnieri & Centalla asiatica

b) Heart and Circulatory System-Hawthorn plant

c) Immune System -Echinacea

d) Digestive System-Ginger valerian root fennel

e) Respiratory System-Licorice root, kava kava

f) Urinary System-Cranberry, Saw palmetto

g) Musculoskeletal System-Fever few

Flowers

Medicinal values, nutritional importance, culinary uses, effect of cooking of
Edible flowers – Drumstick, Neem, Agathi, Plantain
Ornamental edible flowers – Hibiscus, lotus, rose

REFERENCES:

1. Chatwick. R. (2003), Functional Foods Springer.
2. David H Watson (2001), Performance Functional Foods, Culinary and Hospitality Industry Publications.

3. Israel Goldberg (2001), Functional Foods Designer Foods Pharma Food,Nutraceuticals ,Culinary and Hospitality Industry Publications.
4. Mary K Schmidl and Theodore P.Labuza, (2000), Essentials of Functional Foods, Culinary and Hospitality Industry Publications Services.
5. Mazza G. (1998), Functonal Foods Biochemical Processing Aspects, Culinary and Hospitality Industry Publications.
6. Robert E C Wildman (2001), Handbook of Nutraceuticals and Functional Foods ,Culinary and Hospitality Industry Publications.

JOURNAL REFERENCES:

1. Nutraceuticals World Magazine - Exclusives, Markts, Health,Jobs, Events
2. The American Journal of Clinical Nutrition, Waverfy Press, USA.
3. The Indian Journal of Medical Research, The Indian Council of Medical Research, New Delhi.

WEB REFERENCES:

1. http://www.wisegeek.com/what-are-the-health-benefits-of-hibiscus-tea.htm
2. http://www.livestrong.com/article/119463-health-benefits-hibiscus-tea/
3. http://www.oohoi.com/natural%20remedy/everyday_food/benefits-lotus.htm
4. http://www.diethealthclub.com/health-food/rose-health-benefits.html
5. http://www.homeremediesweb.com/ginseng-health-benefits.php

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Define and understand the concepts of functional foods.
CO 2	Categorize the bioactive components of functional foods.
CO 3	Distinguish the role of prebiotics, probiotics & synbiotics as functional ingredients.
CO 4	Explain the efficacy of herbs and flowers as functional foods
CO 5	Build knowledge on the role of Nutraceuticals in treating diseases

I M.Sc.,HUMAN NUTRITION AND NUTRACEUTICALS

SEMESTER –II

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSNN	19PG2N8	Research Methodology	Lecture	6	4

COURSE DESCRIPTION

The course provides a detailed insight on the types of research, methods of collecting data, sampling techniques, framing hypothesis and ultimately preparing the research report

COURSE OBJECTIVES

- To impart the necessary knowledge to frame an experimental design to carry out systematic research work
- To help the students to do the project systematically.

UNITS

UNIT –I RESEARCH COMPONENTS AND TYPES (18 HRS.)

Meaning of research – objectives of Research – Motivation in Research – Types of Research – Research approaches – Significance of Research and Scientific Method. Qualities of Good Research – Problems Encountered by Researchers in India. Identifying a Research, Necessary condition for Formulation of the research Problem – Criteria for Good Research Project.

UNIT –II METHODS OF DATA COLLECTION (18 HRS.)

Primary data: Observation, Experimentation, Simulation, Interviewing, Questionnaire, Projective technique.

Secondary data: Published and Unpublished sources

UNIT –III SAMPLING TECHNIQUES (18 HRS.)

Characteristics of good sample, advantages and disadvantages of sample.

Sampling techniques – Probability or random sampling, Non Probability or Non random sampling, Sampling and non sampling errors.

UNIT –IV FORMULATION OF HYPOTHESIS (18 HRS.)

Hypothesis – Definition, Role and Types , criteria for useful hypothesis — its formulation. Tabulation – editing – coding – analysis and interpretation of data. Procedure for testing hypothesis.

UNIT –V THESIS AND REPORT WRITING (18 HRS.)

Components or layout of a Thesis – Introduction, Review of Literature, Methodology, Results and discussion, Summary and conclusion, Bibliography, Footnotes and Appendix

Significance of report writing – Types of report, oral presentation, Mechanics of writing and Precautions of writing research report, scientific writing.

Plagiarism - Meaning and significance.

REFERENCES :

1. Donald..Mc. Burney(1994). *Research Methods*, (3th Edition), Thomson – Wordsworth ,California.
2. Ghosh B.N., (1987). *Scientific method & Social Research:* (4th Edition), Sterling Publishers Pvt. Ltd., NewDelhi,.
3. Goode &Hatt, (1983). *Methods and Social Research (*23rd Printing), McGraw Hill International Book Company,.
4. Gopal Lal Jain, (1998), *Research Methodology – Methods tools and Techniques*, Mangal Deep Publications, Jaipur.
5. Gupta S.P. (2001). *Statistics,* S. Chand & Company LTD, New Delhi.
6. Kothari C.R., (2004). *Research Methodology (*3rd reprint Edition), New Age International Publishers, New Delhi,
7. Krishnaswamy O.R. & Ranganathan M., (2006). *Methodology of Research in Social Sciences*, Himalaya Publishing House, New Delhi.
8. Pillai &Bagavathi R.S.N. (1983). *Statistics*, S.Chand& Company LTD, New Delhi, .
9. Sadhu & Singh, (2001) *Research Methodology in Social Sciences (*2ndEdition) Himalaya Publishing House, Mumbai,
10. Santhosh Gupta, (2001). *Research Methodology and Statistical Techniques*, Deep and Deep publications, New Delhi.
11. Sonachalam K.S., (1988). *Research Methodology of Social Science*, Emerald Publishers, Madras.

12. Yogesh Kumar Singh &Ruchikanath, (2005). *Research Methodology,* A.P.H. Publishing Corporation, New Delhi.

WEB REFERENCES:

1. http://www.biomedcentral.com
2. http://www.tandfonline.com

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Classify the types of research based on intent and methods
CO 2	Restate in own words the significance and formulation of research
CO 3	Categorize methods of data collection
CO 4	Distinguish the sampling techniques
CO 5	Summarize the steps in formulation of hypothesis and tabulation
CO 6	Explain the layout of a thesis, report writing and plagiarism

I M.Sc. HUMAN NUTRITION AND NUTRACEUTICALS

SEMESTER –II

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSNN	19PG2N9	Clinical Nutrition and Diet Therapy Lab	Lab	4	2

COURSE DESCRIPTION

The course provides skill in assessment, estimation of nutritional requirement, planning and evaluation of menus for various diseases.

COURSE OBJECTIVES

- To estimate the nutritional requirements for therapeutic conditions
- To plan diets for disease conditions
- To develop skills in diet counselling

UNITS

UNIT–I PLANNING AND PREPARATION OF DIET FOR METABOLIC DISORDERS (12 Hrs.)

Diet planning and preparation for diabetes and gout.

UNIT–II PLANNING AND PREPARATION OF DIET FOR CARDIOVASCULAR DISEASES (12 Hrs.)

Diet planning and preparation for atherosclerosis and hypertension.

UNIT–III PLANNING AND PREPARATION OF DIET FOR GASTROINTESTINAL DISORDERS (12 Hrs.)

Diet planning and preparation for peptic ulcer, constipation, diarrhoea, cirrhosis and hepatitis.

UNIT –IV PLANNING AND PREPARATION OF DIET FOR KIDNEY DISEASES (12 Hrs.)

Diet planning and preparation for glomerulonephritis, acute renal failure and nephrolithiasis.

UNIT –V PLANNING AND PREPARATION OF DIET FOR CANCER AND AIDS (12 Hrs.)

Diet planning and preparation for cancer and AIDS

REFERENCES

1. Davidson, S.S. Passmore, P. Brack, J.F. (1993). *Human Nutrition and Dietetics*, 9th Ed, F&S, Lingstone Ltd., Edinburgh and London,
2. Garrow.J.S, W.P.T. James, 9th Ed 1993, *Human Nutrition and Dietetics*, Churchill Livingstone.
3. Kathleen Mahan.L , 13th Ed, (2011), Sylvia Escott-Stump, Janice L Raymond *Krause's Food & Nutrition Therapy*, Elsevier Publications,.

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Recall the dietary principles for the planning and preparation of diet for metabolic disorders.
CO 2	Demonstrate therapeutic diet for cardiovascular disorders.
CO 3	Plan diets for the management of gastrointestinal diseases.
CO 4	Focus on the aspects of planning and preparation of diet for kidney disorders.
CO 5	Indicate the dietary principles in the preparation of diet for cancer and AIDS.

I M.Sc.,HUMAN NUTRITION AND NUTRACEUTICALS

SEMESTER –II

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSNN	**19PG2N10**	**Functional Foods and Nutraceutical Lab**	**Lab**	**4**	**2**

COURSE DESCRIPTION

The practical course provides hands –on training in the use of hi-tech precision equipments to identify and analyze the specific nutraceuticals present in the respective functional food.

COURSE OBJECTIVES

- To make the students aware of the principle of analysis, extraction and identification of nutraceuticals.
- To determine qualitatively and quantitatively the presence of certain bioactive components in particular foods.
- To understand the calculation of the quantity of nutraceuticals present in the foods.

UNITS

UNIT –I Estimation of lycopene (12 HRS.)

Estimation of lycopene in food sources like tomato, papaya & watermelon

UNIT –II Estimation of curcumin (12 HRS.)

Estimation of curcumin in food sources like turmeric, ginger and avocados

UNIT –III Estimation of phenols (12 HRS.)

Estimation of phenols in food sources like soybean, oats and almonds

UNIT –IV Estimation of tannins (12 HRS.)

Estimation of tannins in food sources like grapes, pomegranates and chocolates

UNIT –V Estimation of lignin & capsaicin (12 HRS.)

Estimation of lignin in Wheat and pistachios & Estimation of capsaicin in pepper and chillies

REFERENCES:

1. Berwal. J.S,.Grewal R.B,.Kapoor C.M &.Garg M.R (2004). *Practical Methods in Food Analysis*. Agrotech Publishing Academy, Udaipur.
2. Geetha Swaminathan & Mary George, (2002). *Laboratory Chemical Methods in Food Analysis*. Margham Publications, Chennai.
3. Jayaraman J. (1996), *Laboratory Manual in Biochemistry*. New Age International Ltd. New Delhi.
4. Ranganna S. **(**1986), *Hand Book of Analysis and Quality Control for fruit and Vegetable Products*. Tata Mc Graw –Hill Publishing Company Limited, New Delhi.
5. Sadasivam S. & Manickam A.**(**1991), *Biochemical Methods*. New Age International Pvt. Ltd., New Delhi.
6. Yeshajahu Pomeranz & Clifton E. Meloan,(2004), *Food Analysis –Theory and Practice*. CBS Publishers and Distributors, New Delhi.

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Identify the various nutraceutical components present in functional foods.
CO 2	Choose the appropriate methods to analyze the specific nutraceutical component.
CO 3	Construct the experimental research with the knowledge of the analytical methods.
CO 4	Draw conclusions on the therapeutic availability of nutraceuticals.

I M.Sc. HUMAN NUTRITION AND NUTRACEUTICALS

SEMESTER –II

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSNN	19PGNEDC2	Nutrition & Dietetics	EDC	3	3

COURSE DESCRIPTION

This course offers scientific understanding of the role of nutrition in health diseases.

COURSE OBJECTIVES

- To understand the basics of nutrition.
- To learn the menu planning methods for family members.
- To learn the clinical aspects of disease conditions and diet therapy.

UNITS

UNIT –I INTRODUCTION TO NUTRITION (9 HRS.)

Nutrition – definition, nutritional status, nutrients and their function, relationship of food and health – Characteristics of good nutrition – balanced diet – BMI, IBW, Dietary guidelines-basic food groups, food pyramid

UNIT –II MACRO NUTRIENTS (9HRS.)

Classification, functions, sources, deficiency of carbohydrates, protein, lipids.

UNIT –III MICRO NUTRIENTS (9 HRS.)

Functions, sources, deficiency disorders of Vitamins – Fat soluble vitamins A, D, E, K; Water Soluble vitamins – B1, B2, Niacin, B6, B12, Folic acid.

Minerals – Ca, P. Zn, Fe, I, Fl.

UNIT –IV NUTRITION FOR DEVELOPMENTAL MILESTONES (9 HRS.)

Menu planning, Principles of planning meals,

Nutritional importance of pregnancy, changes incurred and complications

Nutritional importance of lactation

Nutrition during infancy – growth and development, advantages of breast feeding and bottle feeding, formulation criteria for bottle milk. Supplementary foods.

Nutritional importance for adolescence.

UNIT –V PRINCIPLE OF DIET THERAPY (9 HRS.)

Definition of Diet therapy, Foods to be included and avoided – obesity and underweight, diabetes mellitus, typhoid, peptic ulcer, anaemia, CVD.

BOOK REFERENCES:

1. Srilakshmi B (2012) *Dietetics*, New Age International Publishers,
2. Antia F.P. (1989) *Nutrition Dietetics*, Oxford University Press
3. Swaminathan M (1988) *Advanced text book on Food and Nutrition*, Vol I and Vol II, The Bangalore Printing and Publishing Co., Ltd.,

WEB REFERENCES:

1. www.americanheart.org
2. www.cancer.org
3. www.diabetes.org
4. www.eatright.org/
5. www.pugmarks.cons/aims

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	State the different nutrition terms and concepts of food and nutrition.
CO 2	Describe the role of macro and micro nutrients in human nutrition.
CO 3	Identify the food sources and deficiency effects of micro and macronutrients.
CO 4	Summarise the importance of nutrition in the different stages of life span.
CO 5	Apply the principles of diet therapy in the management of diseases.

II M.Sc., HUMAN NUTRITION & NUTRACEUTICALS

SEMESTER –III

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSNN	PG3N11	Functional Foods & Nutraceuticals in Preventive Dietetics	Major Core	6	5

COURSE DESCRIPTION:

The course elicits the role of various bioactive components in the prevention and treatment of therapeutic conditions.

COURSE OBJECTIVES

The students will be able to

- Identify the role of functional foods and nutraceuticals in oral, gut and renal health.
- Describe the importance of functional foods in weight management and CVD
- Categorize the functional foods for bone health and diabetes.
- Summarize the effect of functional foods and Nutraceuticals in cancer
- Choose the functional foods for the management of nervous and respiratory disorders.

UNIT-I FFN IN ORAL / GUT & RENAL HEALTH [18 HRS]

FFN in Oral health

Dietary strategies for oral health

Functional Foods for promoting oral health – xylitol

Relationship between dental caries and dietary carbohydrates

FFN in Gut health

Colonic functional foods –Prebiotic, Probiotic and Symbiotic

Host microbe interaction

Improving the effectiveness of probiotics and prebiotics in optimizing gut health.

Dietary fiber and gut health

FFN in Renal health

Role of functional foods in prevention and treatment of renal disorders – urinary infection, glomerulonephritis, nephrosis, acute renal failure.

UNIT-II FFN FOR OBESITY, CARDIOVASCULAR DISEASES & DIABETES MELLITUS [18 HRS]

FFN in Obesity

Role of hormones in obesity.

Role of functional foods in the management of obesity.

FFN in CVD

Role of Functional foods in the management of CVD

FFN in Diabetes Mellitus

Role of Functional Foods and nutraceuticals in blood sugar support

UNIT-III FFN FOR BONE AND REPRODUCTIVE HEALTH [18 HRS]

FFN in Bone Health

Bone growth and factors affecting bone mass

Role of functional foods in bone health - Osteoporosis.

FFN in Reproductive Health

Role of FFN in reproductive health

Female infertility-types, role of FFN in managing infertility

Functional foods for menopausal health

UNIT-IV FFN IN CANCER & AIDS [18 HRS]

FFN in Cancer

Types of Cancer

Risk factors – Endogenous and exogenous risk factors

Role of functional foods in the prevention of cancer – Symbiotics, Glucosinolates, Phytoesterogens, Dietary fiber and vitamins, Antioxidants.

FFN in AIDS

Role of functional foods in the prevention and treatment of AIDS

UNIT-V FFN IN NERVOUS & RESPIRATORY SYSTEM [18 HRS]

Brain mechanisms involved in mood

Role of functional foods in Mood and memory

Alzheimers and Parkinsons diseases – Definition, causes,symptoms symptoms,role of functional foods

Role of functional foods in the prevention and treatment of respiratory disorders.

REFERENCES:

1. Chatwick R et al. (2003), *Functional Foods*, Springer, Culinary and Hospitality Industry Publications Services.
2. David H Watson, (2001), *Performance Functional Foods,* Culinary and Hospitality Industry Publications.
3. Hari Niwas Mishra et.al., *Functional Foods*, New India Publishing Agency, New Delhi.
4. Israel Goldberg, (2001), *Functional Foods Designer Foods*, Pharma Food,Nutraceuticals Culinary and Hospitality Industry Publications.
5. Mary K. Schimdl and Theodore P Labuza, (2000), *Essential of Functional Foods, C*ulinary and Hospitality Industry Publications Services.
6. Mazza G. (1998), *Functional Foods Biochemical Processing Aspects,* Culinary and Hospitality Industry Publications
7. Robert E C, (2001), Wildman *Handbook of Nutraceuticals and functional Foods*, Culinary and Hospitality Industry Publications.

JOURNAL REFERENCES:

1. Nutraceuticals World Magazine - Exclusives, Markts, Health,Jobs, Events
2. The American Journal of Clinical Nutrition, Waverfy Press, USA.
3. The Indian Journal of Medical Research, The Indian Council of Medical Research, New Delhi.

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1. http://en.wikipedia.org/wiki/Bone

1. simple.wikipedia.org/wiki/Digestion - 17k

2. www.cvphsysiology.com-Comprehensive explanation of basic cardiovascular concepts

3. www.medicalnewstoday.com/articles/11949.php - 59k

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Identify the role of functional foods and nutraceuticals in oral, gut and renal health.
CO 2	Describe the importance of functional foods in weight management and CVD
CO 3	Categorize the functional foods for bone health and diabetes
CO 4	Summarize the effect of functional foods and Nutraceuticals in cancer
CO 5	Choose the functional foods for the management of nervous and respiratory disorders

II M.Sc., HUMAN NUTRITION AND NUTRACEUTICALS

SEMESTER –III

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSNN	PG3N12	Community Nutrition	Major Core	6	5

COURSE DESCRIPTION

The course imparts the knowledge on various national nutritional problems and its implications, nutrition awareness among various sections of the population.

COURSE OBJECTIVES

- To understand national nutritional problems and their implications.
- To become familiar with the national and international contributions towards improvement of nutrition in India.
- To impart skills in the planning and execution of nutrition awareness programmes among various sections of the population.

UNITS

UNIT –I NUTRITION AND NATIONAL DEVELOPMENT, NATIONAL NUTRITIONAL PROBLEMS (18 HRS.)

Relation of nutrition to national development in terms of socio-economic, industrial and agricultural development.

National nutritional problems – prevalence, causes, consequences and prevention of PEM, vitamin A deficiency, anaemia, iodine deficiency, and fluorosis

UNIT –II MALNUTRITION, STRATEGIES TO OVERCOME MALNUTRITION (18 HRS.)

Malnutrition - Definition, etiology and consequences

Strategies to overcome malnutrition: Food based strategies – Dietary diversification, Horticulture intervention, Food fortification, Nutrition & Health education, Nutrition based strategies – Supplementation, Concepts of Selecting / implementing and intervention strategy.

UNIT–III NUTRITION INTERVENTION PROGRAMMES - NATIONAL, INTERNATIONAL (18 HRS.)

Genesis, objectives and operation of nutrition intervention programmes in India – School lunch programme, CMNMP, ICDS organized by government for vulnerable sections of the population.

National organizations – ICMR, CSWB, SSWB, NIN, NNMB, CFTRI, DFRL, NIPCCD.

International organization : FAO, WHO, UNICEF, KGNMT, CARE.

UNIT–IV NATIONAL NUTRITION POLICY, NUTRITIONAL SURVEILLANCE (18 HRS.)

National Nutrition policy – aim, nutrition policy instruments and its implementation; Health indicators.

Nutrition Surveillance System- definition, objectives, uses, infrastructure, Health indicators for successful nutrition surveillance programme.

UNIT –V NUTRITION EDUCATION, ASSESSMENT OF NUTRITIONAL STATUS OF COMMUNITY

Nutrition Education - Definition, importance, Process of nutrition education and communication – components of communication process, phases of nutrition education – conceptualization, formulation, implementation and evaluation, Methods of Nutrition education – face to face, mass media, traditional media, and criteria for selecting methods.

Assessment of nutritional status – Direct and indirect methods of assessment.

REFERENCES:

1. Davidson, S.S. Passmore, P. Brack, J.F. (1993) .*Human Nutrition and Dietetics, 9th Edition*, F&S, Lingstone Ltd., Edinburgh and London.
2. Gupta J.P. & Indra Murali (1989) *National Review of Immunisation Programme in India*, National Institute of Health and Family Welfare, New Delhi.
3. Jose M. Conon (1988). *Food Toxicology – Part A Principles and Concepts,* Marceldebber, Inc., New York.
4. King F.S. & Burgess, A. (1992).*Nutrition for Developing Countries, 2nd edition*, Oxford, Oxford University Press, London.
5. Rajammal P. Devadas (1980) *Nutrition and Nutritional Development*, Saradalaya Press, Coimbatore, Tamil Nadu.
6. Sach Dev. H.P.S. & Choudhury, P. (1994).*Nutrition in Children – Developing Country Concerns,* Cambridge Press, New Delhi.
7. Shanthi Ghosh, (1992) .*The Feeding and care of Infants and Young Children,* Voluntary Health Association of India, New Delhi.

8. Shanthi Ghossh (1997) *Nutrition and Child Care, A Practical Guide*, Jay Pee Brothers, Medical Publishers (P) Ltd., New Delhi.
9. UNICEF (1990). *Children and Women in India*, Situation Analysis, New Delhi.

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1. Journal of Community Health.
2. Journals of Nutrition Education and Behavior.
3. Asia Pacific Journal of Public Health.
4. Indian Journal of Nutrition and Dietetics
5. Journal of Nutrition and Health Sciences

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1. www.nutritionsociety.org
2. www.who.int
3. www.nin.res.in
4. www.publichealth.org
5. www.fda.gov

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Identify National Nutritional problems
CO 2	Recognize the relation of nutrition in national development
CO 3	Explain the strategies to overcome malnutrition
CO 4	Categorize nutrition intervention programmes and organization
CO 5	Describe national nutrition policy and nutrition surveillance system
CO 6	Organize nutrition education programme and assessment of nutritional status of the community

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SEMESTER –III

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSNN	PG3N13	Analytical Instrumentation	Major Core	6	5

COURSE DESCRIPTION

The course offers the understanding of the principles, instrumentation and analytical techniques of food

COURSE OBJECTIVES

- To understand the principle and instrumentation of hi-tech analytical techniques.
- To gain knowledge on applications of different analytical instruments.

UNITS

UNIT –I CHROMATOGRAPHY (18HRS.)

Meaning – Types of Chromatography – principles, components and applications of

i. Paper Chromatography – Ascending and descending – One and two dimensional
ii. Thin Layer Chromatography
iii. Gas Chromatography
iv. Ion exchange
v. Gel filtration
vi. High Performance Liquid Chromatography

UNIT –II ELECTROPHORESIS (18 HRS.)

Meaning –Types –Paper, Starch, Gel, Agar-gel, Poly Acrylamide gel, Moving boundary Electrophoresis, Immuno electrophoresis – Principle – components – Applications.

UNIT –III COLORIMETRY, FLUORIMETRY AND CENTRIFUGATION (18 HRS.)

Photoelectric Colorimeters, Fluorimeters –Principle -Applications.

CENTRIFUGATION:

Types of Centrifuge – Ordinary and Ultracentrifuge - Principle and applications.

MICROBIOLOGICAL ASSAYS

Types of Assays -Principle - Requirements for the conduct of Microbiological assays –Applications.

UNIT –IV SPECTROSCOPY (18 HRS.)

SPECTROSCOPY:

Spectrophotometry – Spectrophotometers – Atomic Absorption Spectrophotometry & ICP.

Spectrophotometers –Principle – Applications.

NMR and NIR:

Nuclear Magnetic Resonance- Application and principle

Near Infra Red -Principle and Application

UNIT –V ISOTOPES (18 HRS.)

Types – Stable and Radioactive, Units of radio-activity – Uses in biological investigations - Geiger Muller Counter and Scintillation Counter – Effects of ionizing radiation-hazards and prevention - Applications.

pH and Buffer:

pH meter –measurement of pH, Buffer – Definition – Types – Buffer system with special reference to living body.

REFERENCES:

1. Ewing. W.W. (1970). *Instrumental Methods of Chemical Analysis.* McGraw Hill Book Company, New Delhi.
2. Mahinder Singh, (2003). *Analytical Chemistry – Instrumental Techniques.* Dominant Publishers and Distributors, New Delhi.
3. Nikelal, (1973). *Experimental methods in Biophysical Chemistry*. John Wiley Publishers.
4. Yadav M.S (2001). *Instrumental Methods of Chemical Analysis*. Campus Books Internationals, New Delhi.

WEB REFERENCES:

1. www.rpi.edu
2. www.rajaha.com
3. www.chemistry.adelaide.edu
4. www.docstoc.com

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Explain the principles of analytical instrumentation techniques.
CO 2	Choose the relevant analytical techniques for food.
CO 3	List the applications of different analytical instruments.
CO 4	Categorize the different types of isotopes and its application
CO 5	Describe the principles and application of microbial assays.

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SEMESTER –III

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSNN	PG3NE1	FOOD PRODUCT DEVELOPMENT AND SENSORY EVALUATION	Major Elective 1	4	4

COURSE DESCRIPTION

This course gives in-depth knowledge on the development, evaluation & marketing of food products.

COURSE OBJECTIVES

- To understand the consumer needs and demands in the society.
- To develop innovative food products based on the consumer needs.
- To gain knowledge on the marketing and evaluation of food products.

UNITS

UNIT –I FOOD NEEDS AND CONSUMER PREFERENCE (12 HRS.)

Food needs and population, Hierarchy of food needs- Instrumental food, Novel food, Good- tasting food, Reliable, Ongoing access to food, Acceptable food and Enough food, Factors impacting food choices – Physiological, Psychological, Economical and Social. Consumer Preference – Definition, Meeting consumer demands.

UNIT –II PROCESS OF FOOD PRODUCT DEVELOPMENT (12 HRS.)

Definition and Need for Product development, Classification and Characteristics of food product,Phases in food product development, Factors influencing product development, Consumer acceptance of new food products, Future trends in food product development.

UNIT –III SENSORY EVALUATION OF FOOD PRODUCT (12 HRS.)

Definition, Sensory characteristics of food, Requisites for conducting sensory tests – trained panel members, testing laboratory, preparation of samples, techniques of smelling and tasting, testing time, design of experiment. Types of tests: Difference tests –Paired comparison test, Duo-trio test, Triangle test. Rating tests – Ranking test, Single sample test, Two sample difference test, Multiple sample difference test, Hedonic rating test, Numeric scoring test, composite scoring test, Sensitivity tests – Sensitivity threshold test, dilution test. Descriptive tests – Descriptive flavour profile method.

UNIT –IV MARKETING OF FOOD PRODUCT (12 HRS.)

Food Marketing, Historical phases of food marketing, Components of food marketing, Requisites of selling a product; Trends in Food Market; Marketing methods, Advantages and disadvantages of marketing methods; Market testing – Where, When, How, What to market; Evaluating the results; Failures in the Market places – Causes of failure – external and internal reasons.

UNIT –V ECONOMIC EVALUATION OF FOOD PRODUCT (12 HRS.)

Costing / Pricing- Steps for determining product price; Calculation of selling price; Product cost-Variable and Fixed cost; Categories of Product Cost-Material, Labor, Overhead cost, Breakeven point. Product launch- Meaning, Benefits, Steps to launch a new product. Commercialization of product-Meaning, Key aspects, Commercialization process, Action plan.

REFERENCES:

1. Fuller,G.W. (1994) *New Food Product Development from Concept to Market Place'* CRC Press, Boca Raton,USA.
2. Gould,W.A., (1991) 'Research and Development Guidelines for the Food Industry' CTI Pub, Baltimore.
3. Lyon,D.H., (1992) *'Guidelines for Sensory Analysis in Food Product Development and Quality Control'* Chapman and Hall, London.
4. Robinson J, Roberts H, Barnard E, and Shepard T (2001) *'Design and Make It Food Technology'* Nelson Thomes Ltd, UK.
5. Srilakshmi, B. (2008), *Food science,* New age international publishers, New Delhi.

JOURNALS REFERENCES:

1. Journal of Food Products Marketing, Open Access journal, Taylor and Francis publishers, England.
2. Journal of Food Science and Technology. AFST, CFTRI, Mysore.

WEB REFERENCES:

1. https://www.tandfonline.com
2. https://www.ajol.info

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Identify the food needs and consumer demands in the society
CO 2	Explain the classification, characteristics and future trends in food product development
CO 3	Choose the different sensory tests employed for food evaluation
CO 4	Build knowledge on the marketing and evaluation of food products
CO 5	Categorize the food products according to the product cost

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SEMESTER –III

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSNN	PG3NE2	INSTITUTIONAL MANAGEMENT	Major Elective 2	4	4

COURSE DESCRIPTION

The course will describe the concepts of organization and management approaches of food service establishment.

COURSE OBJECTIVES

- To develop a knowledge base in key areas of institutional food administration.
- To impart necessary expertise to function as a food service manager.
- To understand the basic principles of organization and management in food service units.

UNIT –I **[12 HRS]**

INTRODUCTION TO FOOD SERVICE INSTITUTIONS

Definition of food service institutions, Evolution of food service systems, Characteristics of the various types of food service units.

Kinds of food service systems - Conventional, commissary, ready prepared, assembly/serve

UNIT –II **[12 HRS]**

INSTIUTUTIONAL MANAGEMENT

Theories - Classical, Scientific, Behavioral, Systems approach, Contingency approach, Management By Objective(MBO), Just-in- Time(JIT), Total Quality Management (TQM). Functions of management, Principles of management, management tools

UNIT –III **[12 HRS]**

PERSONNEL MANAGEMENT

Personnel management -Definition, scope, concept of personnel management, approaches of personnel management, personnel policies, Functions of personnel manager.

Selection- Definition, Steps. Induction- Definition, Methods, Check list

Staff welfare provisions- Physical needs, Physiological needs, Psychosocial Needs

Training- Need for training, Katz and Kahn point about change in an organization, Training programmes, Areas of training. Staff development- Principles of development, Process of development.

UNIT –IV **[12 HRS]**

FOOD COST MANAGEMENT

Costing-Definition of costing, Definition of Cost, Cost components, Behaviour of cost,

Cost control-Definition, Factors responsible for losses, Methods of controlling food cost

Food cost analysis. Pricing-Definition, Methods of pricing- Cost plus pricing, Rate of return pricing.

UNIT –V

LAWS GOVERNING FOOD SERVICE ESTABLISHMENTS **[12 HRS]**

Labour laws- The Indian Contract Act, Workmen's Compensation Act, The Trade Unions Act, Payment of Wages Act, Industrial Disputes Act, The Factories Act, The Minimum Wages Act, Employees State Insurance (ESI) Act, Employees Pension Scheme, Shops and Establishments Act, Hostel Scheme, Annapurna Scheme.

REFERENCES:

1. Knosotz, H.O Donnel C (1968) *Principles of Management,* McGraw Hill Book Company.
2. Kotas Richard & Jayawardardene.C (1994): *Profitable food and Beverage Management*, Hodder & Sloughton Publication.
3. Sethi Mohini (2000), *Catering Management An integrated Approach*, 2nd Ed Wiley Publication.
4. West, B Bessie & Wood, Levelle (1986) *Food Service in Institutions* 6th Ed, Macmillian Publication Company, New York.

WEB REFERENCES:

1. https://www.setupmyuhotel.com
2. www.tutorialspoint.com
3. https://careertrend.com
4. https://www.ecpi.edu

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Recognize the key areas of food service institutions.
CO 2	Identify the theories and concepts of institutional management.
CO 3	Analyse the scope and theories of personnel management.
CO 4	Explain the aspects of food cost management.
CO 5	Categorize the different laws governing food service establishment.

II M.Sc. HUMAN NUTRITION AND NUTRACEUTICALS
SEMESTER –III

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSNN	PG3N14	Community Nutrition Lab	Lab	4	2

COURSE DESCRIPTION

The practical course provides hands -on training on assessing the nutritional status, preparation of supplementary foods and imparting nutritional education for the vulnerable groups in the community.

COURSE OBJECTIVES

- To impart skills in the planning and execution of nutrition awareness programmes among various sections of the population.
- To develop skill in the assessment of nutritional status

UNITS

UNIT –I Assessment of nutritional status (ABC) (12 HRS.)

Assessment and interpretation of nutritional status (ABC) - pregnant woman, lactating mother, preschool children, school going children and elderly people.

UNIT –II Assessment of nutritional status (D) (12 HRS.)

Dietary assessment- 24 hour recall method, weighment method and food frequency method.

UNIT –III Audio-Visual Aids (12 HRS.)

Preparation of audio- visual aids- charts, posters, pamphlets, folders and videos. Principles of campaign, exhibition and demonstration.

UNIT –IV Nutrition education (12 HRS.)

Planning nutrition education for different age group.

UNIT –V Supplementary foods (12 HRS.)

Formulation of supplementary foods.

REFERENCES:

1. Rajammal P. Devadas (1980) *Nutrition and Nutritional Development*, Saradalaya Press, Coimbatore, Tamil Nadu.
2. Sach Dev. H.P.S. & Choudhury, P. (1994).*Nutrition in Children – Developing Country Concerns,* Cambridge Press, New Delhi.
3. Shanthi Ghosh, (1992) .*The Feeding and care of Infants and Young Children,* Voluntary Health Association of India, New Delhi.
4. Shanthi Ghossh (1997) *Nutrition and Child Care, A Practical Guide*, Jay Pee Brothers, Medical Publishers (P) Ltd., New Delhi.
5. UNICEF (1990). *Children and Women in India*, Situation Analysis, New Delhi.

WEB REFERENCES:

1. www.icmr.nic.in
2. www.who.int

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Identify the nutritional status of various age groups
CO 2	Classify and construct audio visual aids
CO 3	Organize nutrition awareness programmes for community
CO 4	Categorize and plan supplementary foods for the vulnerable groups in the community

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SEMESTER –III

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSNN	PG3N15	Techniques for Experimental Nutrition Lab	Lab	4	2

COURSE DESCRIPTION

The practical course provides hands –on training in the use of hi-tech precision equipments to identify and analyze the various nutrients present in the food.

COURSE OBJECTIVES

- To understand the techniques involved in analyzing the nutrients present in foods.
- To familiarize in handling analytical instruments.

UNITS

UNIT –I Estimation of Carotene (12 HRS.)

Carotene in Fruits

Carotene in Vegetables

UNIT –II Estimation of Ascorbic acid (12 HRS.)

Ascorbic acid in Fruits

Ascorbic acid in Vegetables

UNIT –III Estimation of Carbohydrate & Peroxide Value (12 HRS.)

Estimation of Carbohydrate

Peroxide value

UNIT –IV Estimation of Free fatty acids & Saponification Value(12 HRS.)

Saponification value in fats & oils

Free fatty acids

UNIT –V Estimation of Antioxidants (12 HRS.)

Antioxidant in Fruits

Antioxidant in Vegetables

REFERENCES:

1. Berwal. J.S,.Grewal R.B,.Kapoor C.M &.Garg M.R (2004).*Practical Methods in Food Analysis*. Agrotech Publishing Academy, Udaipur.
2. Horwitz W.,(2000).*Official Methods of Analysis of AOAC International*.AOAC International publishers,Rockville,Mary Land.
3. Jayaraman J. (1996), *Laboratory Manual in Biochemistry*. New Age International Ltd. New Delhi.
4. Ranganna S. **(**1986), *Hand Book of Analysis and Quality Control for fruits and Vegetable Products*. Tata Mc Graw –Hill Publishing Company Limited, New Delhi.
5. Sadasivam S. & Manickam A. **(**1991), *Biochemical Methods*. New Age International Pvt. Ltd.,New Delhi.
6. Swaminathan.G & George.M (2002). *Laboratory Chemical Methods in Food Analysis*.Margham Publications, Chennai.
7. Yeshajahu Pomeranz & Clifton E. Meloan,(2004), *Food Analysis – Theory and Practice*. CBS Publishers and Distributors, New Delhi.

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Recall the principles of analytical techniques
CO 2	Identify the amount of ascorbic acid in foods
CO 3	Explain the procedure for the estimation of β-carotene
CO 4	Compare the amount of free fatty acid and peroxide values in fats and oil
CO 5	Choose the method of analyzing amount of antioxidant present in foods

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SEMESTER –IV

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSNN	PG4N16	Food Microbiology	Major Core	6	5

COURSE DESCRIPTION

The course outlines the role of micro-organism in food spoilage, preservation and processing.

COURSE OBJECTIVES

- To gain knowledge of role of micro-organisms in humans and environment
- To understand the importance of micro-organisms in food spoilage and to learn advanced, techniques used in food preservation.
- To understand the latest procedures adopted in various food operations to prevent food-borne disorders and legal aspects involved in these areas.

UNITS

UNIT –I FOOD AND MICROORGANISMS (18 HRS.)

Food Microbiology – Definition, Basic concept, History of Food Microbiology

Food as substrate for microorganisms – Hydrogen ion concentration, Water activity, Oxidation-Reduction potential, Nutrient content.

Microorganisms important in Food – Industrial importance of Mold, Yeast and Bacteria.

UNIT –II CONTAMINATION, SPOILAGE AND PRESERVATION OF FOODS (18 HRS.)

Contamination, Spoilage and Preservation - Cereals, Vegetables, Fruits, Meat, Fish, Egg, Poultry, Milk and its products, Canned foods.

General Principles of Food Preservation; Methods of Food Preservation- Asepsis, Removal of microorganisms, Maintenance of anaerobic conditions, Use of high temperature, Use of low temperature, Use of chemicals, Drying, Use of Radiation, Non thermal methods – Ohmic heating, High Pressure Processing, Cold Plasma Processing, Pulsed electric field.

UNIT–III FOOD BORNE INFECTIONS (18 HRS.)

Classification of Food borne diseases

Food infection – Definition, Classification, Types – Salmonellosis, Clostridium Perfringes Gastroenteritis, Bacillus cereus Gastroenteritis, E.coli infection, Shigellosis

UNIT–IV FOOD INTOXICATION (18 HRS.)

Food Intoxication – Bacterial food intoxication – Botulism, Staphyloccocal gastroenteritis, Mycotoxins – Definition, Types – Ochratoxin, Aflatoxin, Patulin.

Identification and Enumeration of Microbes in food – Preparation and Distribution of Culture Media, Inoculation of Culture media, Examination of Organisms, Plating techniques.

UNIT –V WATER MICROBIOLOGY

Microbial analysis of water- Sanitary tests for coliforms, MPN of coliforms

Water borne diseases – Definition – common microorganism involved in water borne diseases.

Typhoid - Causes- incubation period – clinical symptoms – mode of transmission – prevention and control.

Diarrhoea- Causes- incubation period – clinical symptoms – mode of transmission- prevention and control.

Cholera – Causes- incubation period – clinical symptoms – mode of transmission- prevention and control.

REFERENCES:

1. Adams M.R.and M.O.Moss (2005), *Food Microbiology*, New Age International (P) Ltd., Publishers, New Delhi.
2. FrazierW.C, (2000), *Food Microbiology*, New Age International (P) Ltd., Publishers, New Delhi.
3. George J.Banwart (2004), *Basic Food Microbiology*, S.K.Jain for CBS Publishers and Distributors, New Delhi.
4. James.M.Jay, (1996), *Modern Food Microbiology*, S.K.Jain for CBS Publishers and Distributors ,4596/1A,11 Darya Ganj,New Delhi- 110 002,.
5. Pelczar.J, Jr.E.C.S.Chan, Noel R.Kieg, (1993), 5th edition *Microbiology*, Tata McGraw Hill Publishing Co., New Delhi,.
6. Rao A.S., (1998), *Introduction to Microbiology*, Asoke K, Ghosh, Pentice-Hall of India Pvt., New Delhi-110 001,
7. Sharma.P.D, (1996), *Microbiology*, Rakesh Kumar Rastogi for rastogi Publications "Gangotri" Shivaji road, Meerut.

JOURNAL REFERENCES:

1. International Journal of Food Microbiology.
2. Frontiers in Microbiology.
3. Annals of Microbiology.
4. Indian Journal of Microbiology.
5. Applied Microbiology and Biotechnology.

WEB REFERENCES:

1. www.microbiologysociety.org
2. www.nature.com
3. www.microbes.info
4. www.microdok.com

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Recall the basic concepts of food microbiology
CO 2	Describe the principles of food preservation
CO 3	Distinguish the contamination and spoilage of foods
CO 4	Choose the appropriate method of food preservation
CO 5	Explain the food and water borne diseases
CO 6	Identify and enumerate the microbes in food

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SEMESTER –IV

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSNN	PG4N17	Nutritional Biochemistry	Major Core	6	5

COURSE DESCRIPTION

The course provides understanding on the structure, metabolism and energetic of macro and micro nutrients and the integration of metabolic systems.

COURSE OBJECTIVES

- To understand the application of biochemistry in the field of foods and nutrition.
- To understand the mechanisms adopted by the human body for regulation of metabolic pathways.
- To understand integration of cellular level metabolic events to nutritional disorders and imbalances.

UNITS

UNIT –I CARBOHYDRATE (18 HRS.)

Structure, Metabolism –Definition, Types of metabolism, Carbohydrate metabolism – Glycogenesis, Glycogenolysis, Glycolysis, Fate of pyruvic acid, Citric Acid cycle, Energetics of glucose metabolism, Hexose Monophosphate Shunt, Gluconeogenesis, Cori Cycle,Uronic Acid pathway.

Inborn errors of carbohydrates metabolism- galactosaemia, fructose intolerance, lactose intolerance

UNIT –II PROTEIN (18 HRS.)

Structure, Mechanism of protein synthesis, Metabolism - Oxidative and non-oxidative Deamination, Transamination, Decarboxylation, Transmethylation, Krebs Urea Cycle, Linkage of Krebs Urea Cycle and Krebs Citric Acid Cycle, Catabolism of Ketogenic amino acids, Catobolism of Glycogenic amino acids, Catabolism of amino acids that are both Ketogenic and Glycogenic, Biosynthesis of amino acids, Energetics of amino acids.

Inborn errors of amino acid metabolism – albinism, phenylketonuria (PKU), maple syrup urine disease (MSUD)

UNIT –III LIPID (18 HRS.)

Structure, Metabolism of fat – β-Oxidation Cycle, Energetics of fatty acid oxidation, Ketosis, Ketogenesis, Ketolysis, Biosynthesis of fatty acids.

Inborn errors of fat metabolism - Gaucher's disease, Tay-sachs disease, Niemann-Pick disease.

UNIT –IV NUCLEIC ACIDS (18 HRS.)

Nucleic acid - Definition and types.

DNA – Structure, Replication, Enzymes involved in replications.

RNA- types and comparison of DNA and RNA.

Metabolism of Nucleic acids - Synthesis and breakdown of purine and pyrimidine.

UNIT –V CELL RESPIRATION AND BIOLOGICAL OXIDATION (18 HRS.)

Site of biological oxidation, pathway of biological oxidation, electron transport system, bioenergetics system.

REFERENCES:

1. Abraham Cantrarow and Bernard Schepartz, (1967). *Biochemistry.* W.B.Saunders Company, London.
2. Albert L.Lehninger, (1984). *Principles of Biochemistry*. CBS Publishers and Distributors, Delhi.
3. Ambika Shanmugam, (1983). *Fundamentals of Biochemistry for Medical Students*. Published by the author, Madras.
4. Jain.J.L., (1988). *Fundametals of Biochemistry*. S.Chand and company (Pvt.) Ltd., New Delhi.
5. Joseph S. Fruton and Sofia Simmonds, (1960). *Biochemistry*. Asia Publishing House, New Delhi.
6. Singh.S.P, (1998). *A Text Book of Biochemistry*. CBS Publishers and Distributors, New Delhi.

JOURNAL REFERENCES:

1. Journal of Nutritional Biochemistry
2. Journal of Biochemistry
3. International Journal of Biochemistry and Cell Biology
4. Journal of Biological Chemistry
5. Indian Journal of Medical Biochemistry

WEB REFERENCES:

1.www.biochemistry.org

2.www.springer.com

3.www.nature.com

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Identify the structure of biomolecules
CO 2	Explain cellular respiration
CO 3	Construct the metabolic pathways of biomolecules
CO 4	Categorize the inborn errors of metabolism of biomolecules
CO 5	Compute the energetic of metabolism of biomolecules

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SEMESTER –IV

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSNN	PG4N18	Advanced Food Science and Processing Techniques	Major Core	6	5

COURSE DESCRIPTION

The course offers the understanding of processing techniques involved to transform raw ingredients into processed food products for human consumption.

COURSE OBJECTIVES

- To understand the science behind processing of foods and its impact on physic-chemical properties of foods
- To provide in-depth knowledge on production of processed food products.

UNITS

UNIT –I CEREAL PROCESSING (18 HRS.)

Structure, Processing of Rice and Wheat- Parboiling and Milling,Physico-chemical changes during parboiling. Corn-dry and wet milling, Oats-Milling, Ragi and Samai - Milling. Processing of Cereal products- Puffed rice, Flaked rice, Quick cooking rice, Rice flour. Wheat products - Vermicelli, Semolina, Extruded products. By- products – Rice bran, Rice bran oil and Husk.

UNIT –II PULSE PROCESSING AND OILSEED PROCESSING (18 HRS.)

Pulse Processing: Structure, Processing of pulses- Decortication, Milling, Germination, Fermentation, Parching, Puffing, Extrusion. Antinutritional factors, Methods to eliminate toxic constituents. Pulse products- dhal, Instant legume powders, Legume protein concentrates. Effect of processing on the physiochemical properties of pulses.

Oil Seed Processing: Structure, Processing of edible oil, Hydrogenated fat and Margarine, Effect of processing on the physiochemical properties of oil seeds. By- products- Oilseed cake, Rancidity-Types and prevention methods

UNIT –III VEGETABLE PROCESSING AND FRUIT PROCESSING (18 HRS.)

Vegetable Processing: Classification of vegetables, General structure of edible portion of vegetables and fruits, Harvesting and storage, Post harvest practices, Vegetable products-Dehydrated vegetables, Canned vegetables, frozen vegetables, Paste, Powder, Pickled vegetables-Sauerkraut, Gherkins.

Fruit Processing: Classification, Maturity concepts, Ripening- Definition, Chemicals for ripening,Changes occurred during ripening and senescence, Harvesting and processing, Storage. Fruit products- dried fruits, Canned fruits, Powders, Fruit juice concentrates.

UNIT –IV MILK AND EGG PROCESSING (18 HRS.)

Milk Processing: Milk processing steps, Properties of milk, Effect of heat on milk.Milk products: Definition, Manufacturing process -Milk powder, Ice cream, Butter, Cheese,Yoghurt and Sweetened condensed milk.
Egg processing: Structure, Egg storage, Egg quality- Evaluation, deterioration during storage, Eggproduct- Egg powder.

UNIT –V MEAT PROCESSING (18 HRS.)

Meat- Structure, Classes, Post-mortem changes, Ageing, Tenderizing, Curing, Cuts and grades and changes during cooking.
Fish- Classification, Selection criteria, - Processing of Smoked fish and canned fish
Poultry- Classification, Processing of poultry and storage.
Products- Ham, Sausages, Bacon.

REFERENCES:

1. Avantina Sharma, (2006)), *Textbook of Food Science and Technology***,** International book distributing company, Lucknow.
2. Potter, N.N. (1978), *Food Science*. AVI Publishing company, INC, Westport, Connecticut.
3. Shakuntala Manay. N., *Foods, Facts and Principles*, New Age International Publishers, New Delhi, II edition.
4. Sivasankar.B, (2002), *Food Processing and Preservation*, PHI

Learning Private Limited, New Delhi.

5. Subbulakshmi.G and Udipi.A.S, (2006), *Food Processing and Preservation*, New Age International Publisher,New Delhi.
6. Vijaya Khader, (2001), *Textbook of Food Science and Technology*, Indian Council of Agricultural Research, New Delhi.

JOURNAL REFERENCES:

1. Journal of Food Science and Technology. AFST, CFTRI, Mysore.
2. Journal of Food Science. The Institute of Food Technologies, Illinois, USA.

WEB REFERENCES:

1. www.fao.org
2. www.icar.org.in
3. www.healthfinder.gov

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Illustrate the structure and milling of cereals.
CO 2	Explain the processing methods of pulses and oilseeds.
CO 3	Choose the methods of harvesting & storage of vegetables and fruits
CO 4	Classify the processing & preservation methods of flesh foods
CO 5	Identify the processing & preparation of milk & egg products

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SEMESTER –IV

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSNN	PG4NE3	FOOD SAFETY AND QUALITY CONTROL	Major Elective 3	4	4

COURSE DESCRIPTION

The course provides an outline on the standards, tools and techniques to ensure safety and integrity of foods in food preparation and processing.

COURSE OBJECTIVES

- To develop approaches to identify food safety hazards in food processing.
- To apply preventive measures and control methods to minimize microbiological hazards and maintain quality of foods.
- To identify the wide variety of parameters affecting food quality.
- To develop quality control strategies.

UNITS

UNIT –I BASIC CONCEPTS OF FOOD SAFETY AND FOOD LAWS (12 Hrs.)

Food and its safety concerns, Importance of safe food, Factors affecting food safety, Threats to safety of food supply, Principles of food quality.

Food Laws: PFA, Essential Commodity Act, Standards of Weights and measures Act, Export Act.

Voluntary Laws: BIS, AGMARK, Consumer Protection Act, FSSA

International Laws: Codex Alimentarius. Code India, ISO, FAO, WHO.

UNIT –II NATURAL TOXINS IN FOOD (12 Hrs.)

Toxicants in animal foods – Shellfish

Toxicants in plant foods - Favism, Gossypol, Toxic amino acids, Toxic alkaloids, Cyanogens, Lima beans, Mushroom poisoning.

Antinutritional factors – Protease inhibitors, Trypsin inhibitors, Haemagglutanins, Phytates, Tannins, Oxalates, Goitrogens

Environmental Toxins - Mercury; Polybrominated biphenyl (PBB); Polychlorinated biphenyl (PCB); Lead; Cadmium; Pesticide residues; Contaminants from plastics

.

UNIT – III FOOD ADDITIVES (12 Hrs.)

Definition, Importance of use in foods, Classification, Types - Preservatives, antioxidants, artificial colours, Flavour enhancers, bleaching agents, nutrient additives, Thickening and stabilizing agents, anticaking, antifoaming, sequestrants sweetening agents, GRAS - Generally Recommended As Safe (GRAS).

UNIT – IV QUALITY ASSURANCE IN FOOD (12 Hrs.)

HACCP – Definition, principles, Guidelines for application of HACCP principles.

ISO 22000, Halal

UNIT – V FOOD PACKAGING (12 Hrs.)

Definition, Functions of Packaging, Classification of Packaging materials, Packaging methods, Moisture Sorption Properties of foods and selection of packaging materials,

Interaction between packaging and foods.

Nutrition labeling and nutrition claims.

REFERENCES:

1. Judith E. Brown, (2002), 3rd Ed, Nutrition Now, Wadsworth, London.
2. Pomeranz Y and Meloan CE (1996), *Food Analysis : Theory and Practice*, CBS Publishers and Distributors, New Delhi.
3. Shirley J. Van Grade, Margy Woodburn. (1999), "*Food Preservation and Safety Principles & Practice"*; Surabhi Publications.
4. Subbulakshmi.G; Shobha.A.Udipi, (2001), "*Food Processing and Preservation*", New Age International Publishers.

WEB REFERENCES:

1. www.fao.org
2. www.healthfinder.gov
3. www.icar.org.in

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Define the concept of food safety and food laws.
CO 2	Explain the toxicants in animal and plant foods.
CO 3	Classify the food additives.
CO 4	Plan the various quality assurance systems in food industries.
CO 5	Categorize the packaging materials and properties.
CO 6	Recognize and understand nutrition labeling/ claims.

II M.Sc. HUMAN NUTRITION AND NUTRACEUTICALS
SEMESTER –IV

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSNN	PG4NE4	NUTRITION IN CRITICAL CARE AND DISASTERS	Major Elective 4	4	4

COURSE DESCRIPTION

The course offers a comprehensive knowledge on the assessment and management of nutritional support system for critically ill.

COURSE OBJECTIVES

- To understand the physiology, metabolism and special nutritional requirements of the critically ill.
- To be familiar with special nutritional support techniques and feeding formulations to meet their nutritional requirements.

UNITS

UNIT –I NUTRITIONAL SCREENING AND ASSESSMENT FOR THE CRITICALLY ILL (12 HRS.)

Nutritional screening and nutritional status assessment of the critically ill. Nutritional support system and other life saving measures for the critically ill.

UNIT –II IMMUNO ENHANCERS AND SPECIAL DIETS IN CRITICAL CARE (12 HRS.)

Role of immuno enhancers, conditionally essential nutrients, immuno suppressants and special diets in critical care.

UNIT –III SPECIAL NUTRITIONAL THERAPY IN CRITICAL ILLNESSES – BURNS, CV AND KIDNEY (12 HRS.)

Patho physiological, clinical and metabolic aspects, understanding the special nutritional requirements, nutritional goals and monitoring the therapy in critical illnesses like stress, trauma, sepsis, burns, CV complications and surgery, dialysis, transplant, multiple organ failure.

UNIT –IV SPECIAL NUTRITIONAL THERAPY IN CRITICAL ILLNESSES – GI AND LIVER (12 HRS.)

Patho physiological, clinical and metabolic aspects, understanding the special nutritional requirements, nutritional goals and monitoring the therapy in critical illnesses like
GI tract surgery, hepatic transplants.

UNIT –V REFEEDING SYNDROME AND ETHICAL ISSUES IN TERMINALLY ILL (12 HRS.)

Complications of nutritional support system including refeeding syndrome
Diet related ethical issues in the terminally ill.

REFERENCES:

1. Mahan,LK. And Escott – Stump.S. (2000), *Krause's food Nutrition and Diet Therapy*, 10th Ed.W.S.Saunders Ltd.
2. Shields, R. (1992), *Bailliere's Clinical Gastroentrology*, Baillere Tindall London.
3. Shikora, S.A. and Blackburn. G.L. (1999). Nutritional Support – Theory and Therapeutics, Chapman and Hall, ITP (International Thompson Publishing).

JOURNAL REFERENCES:

1. Journal of American Dietetic Association, American Dietetic Association, Mount Marris, Illinois, 61054, USA.
2. The American Journal of Clinical Nutrition, Waverfy Press, USA.
3. The Indian Journal of Medical Research, Indian Council of Medical Research, New Delhi.

WEB REFERENCES:

1. www.americanheart.org
2. www.sccm.org/getattachment/Disaster/Nutrition-Therapy
3. www.pugmarks.cons/aims

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Identify nutritional screening and nutritional status assessment.
CO 2	Recognize nutritional support system for critically ill.
CO 3	Summarize the role of immune enhancers, suppresants and special diets in critical care
CO 4	Classify rehabilitation diets
CO 5	Describe the patho-physiology in critical illnesses

II M.Sc.,HUMAN NUTRITION AND NUTRACEUTICALS

SEMESTER –IV

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSNN	PG4N19	Food Microbiology Lab	Lab	4	2

COURSE DESCRIPTION

The course gives the clear idea of assessing the microbes present in foods causing spoilage

COURSE OBJECTIVES

- To enable the students to identify the microbes causing spoilage in foods
- To determine the shelf life of the foods by assessing the microbial count
- To provide insight on the effect of packaging on the microbial load in foods

UNITS

UNIT–I INTRODUCTION TO MICROBIOLOGICAL LABORATORY TECHNIQUES (12 HRS.)

Safety Procedures and Precautions, General Laboratory Directions, Good microbiological laboratory practice (GMLP), Spillage management, Use of equipments, apparatus and materials of microbiological lab.

UNIT –II MICROSCOPY (12 HRS.)

Principles, construction and mode of operation of microscopes; Care and handling of microscopes; Microscopic examination of slide preparation.

UNIT–III STERILIZATION AND DISINFECTANTS (12 HRS.)

Sterilization using the autoclave/pressure cooker, Sterilization of equipment and materials; Choice, preparation and use of disinfectants.

UNIT–IV CULTURE MEDIA (12HRS.)

Culture media –types, preparation, sterilization and storage

UNIT –V INOCULATION, INCUBATION, ENUMERATION (12HRS.)

Serial dilution; Inoculation/Plating techniques – Pour Plate method, Spread Plate method, Streak Plate method; Incubation; Enumeration

REFERENCES:

1. Manual of methods of analysis of foods, FSSAI, Govt. of India, New Delhi.

2. Josephine A. Morello, (2003). *Laboratory manual and workbook in Microbiology*, The McGraw–Hill Companies.

JOURNAL REFERENCES:

1. International Journal of Food Microbiology.

2. Frontiers in Microbiology.

WEB REFERENCES:

1. www.biosci.org.uk/misac

2. www.microbiologyonline.org

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Describe the working principle of compound microscope
CO 2	Compare the culturing techniques
CO 3	Choose the appropriate method of media preparation
CO 4	Identify and enumerate the microbes in food.

II M.Sc.,HUMAN NUTRITION AND NUTRACEUTICALS

SEMESTER –IV

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
PSNN	PG4N20	Nutrient Analysis Lab	Lab	4	2

COURSE DESCRIPTION

The practical course provides hands –on training in the use of hi-tech precision equipments to identify and analyze the various nutrients present in the food.

COURSE OBJECTIVES

- To enable the students to get practical experience in the laboratory
- To develop the skill to undertake research work and carryout experiments in nutrition individually

UNITS

UNIT –I ESTIMATION OF CALORIES AND MOISTURE (8 HRS.)

- Calories in Cereals
- Moisture in foods

UNIT –II ESTIMATION OF ACIDITY AND PROTEIN (12 HRS.)

- Acidity in Fruits
- Protein in pulses

UNIT –III ESTIMATION OF FATS (8 HRS.)

- Fats in Nuts
- Fats in Oilseeds

UNIT –IV ESTIMATION OF CRUDE FIBRE (12 HRS.)

- Crude Fibre in Vegetables
- Crude Fibre in Fruits

UNIT –V ESTIMATION OF ASH & MINERALS (20 HRS.)

- Ash in foods

- ❖ Calcium in Green leafy Vegetables
- ❖ Calcium in Millets
- ❖ Phosphorus
- ❖ Iron

REFERENCES:

1. Berwal. J.S,.Grewal R.B,.Kapoor C.M &.Garg M.R (2004).*Practical Methods in Food Analysis*. Agrotech Publishing Academy, Udaipur.
2. Horwitz W.,(2000).*Official Methods of Analysis of AOAC International*.AOAC International publishers,Rockville,Mary Land.
3. Jayaraman J. (1996), *Laboratory Manual in Biochemistry*. New Age International Ltd. New Delhi.
4. Ranganna S. **(**1986), *Hand Book of Analysis and Quality Control for fruits and Vegetable Products*. Tata Mc Graw –Hill Publishing Company Limited, New Delhi.
5. Sadasivam S. & Manickam A. **(**1991), *Biochemical Methods*. New Age International Pvt. Ltd.,New Delhi.
6. Swaminathan.G & George.M (2002). *Laboratory Chemical Methods in Food Analysis*.Margham Publications, Chennai.
7. Yeshajahu Pomeranz & Clifton E. Meloan,(2004), *Food Analysis – Theory and Practice*. CBS Publishers and Distributors, New Delhi.

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Identify the calorific value of foods.
CO 2	Explain the protein estimation procedure
CO 3	Choose the analytical methods of minerals
CO 4	Build knowledge on the estimation of moisture content in foods
CO5	Compare the amount of crude fibre present in foods.